AMENDMENTS TO THE SPECIFICATION

Please replace the Related Applications paragraph on page 1 with the following amended paragraph.

Reference is hereby made to the following co-pending, commonly assigned, U.S. Patent Number 6,195,357 ~~patent applications: Serial Number 08/719,163~~, entitled, "INTERACTIVE INFORMATION TRANSACTION PROCESSING SYSTEM WITH UNIVERSAL TELEPHONY GATEWAY CAPABILITIES," the disclosure of which is incorporated herein by reference.

Please replace the paragraph beginning at line 23 on page 3 with the following amended paragraph.

Most IVRs are connected into the public switched telephone network (PSTN) in order to facilitate their call handling functions. With the increase in asynchronous communication facilities, such as the internet protocol (IP) network, IVRs will need to include the capability of providing voice response services to such asynchronous communication formats as voice over IP (VoIP). One such IVR system is disclosed in the aforementioned co-pending, commonly-assigned, U.S. Patent Number 6,195,357, ~~application~~ entitled, "INTERACTIVE INFORMATION TRANSACTION PROCESSING SYSTEM WITH UNIVERSAL TELEPHONY GATEWAY CAPABILITIES." However, because VoIP and other asynchronous telecommunication formats are not yet widespread, the majority of IVR applications are still overwhelmingly synchronous and connect to the PSTN.

Please replace the paragraph beginning at line 1 on page 6 with the following amended paragraph.

The present invention is directed to a system and method for an extensible interactive voice response application comprising an application repository ~~server~~ ~~having~~ that stores various application logic and information ~~stored~~ thereon. The application logic is used for defining at least one voice response application resident on the repository ~~server~~. The system also works in conjunction with communication devices for establishing connections with the application repository ~~server~~. According to a preferred embodiment of the present invention,

when a communication device initiates its connection with the application repository ~~server~~, the repository ~~server~~ downloads application logic, or portions thereof, to the communication device to facilitate operation of IVR functions on the communication device. The preferred embodiment application logic may define operations including voice play and/or record, text-to-speech, voice recognition, dual tone multiple frequency (DTMF) input, and/or display multimedia output. Accordingly, the communication device should preferably include memory and a processor capable of executing the downloaded application logic and locally executing ~~administering~~ the particular voice response application. It should be noted, of course, that application logic of the present invention may select or enable particular operations based on the feature set of the particular communication device. Similarly, the application logic may be provided to the communication device in modules or executable portions to accommodate limitations of the communication device's resources and/or to provide efficient operation.

Please replace the paragraph beginning at line 19 on page 6 with the following amended paragraph.

As the communication device executes the voice response application, it may play audible voice cues according to the particular application. A user may enter responses to the voice cues by speaking or entering information using DTMF or other data input format. Depending on the users responses and requests, the communication device may speak or display responsive information to the user. The responsive information may preferably have been downloaded along with the application logic or, after the communication device re-establishes a connection, may be retrieved from the application repository ~~server~~ through internal or external sources.

Please replace the paragraph beginning at line 18 on page 7 with the following amended paragraph.

In addition, the remote communication devices may remain in communication with the application repository ~~server~~ without tying up an expensive port, or otherwise precluding another communication device from the accessing application repository ~~server~~. Thus, processing and system interaction may be going on with several communication devices at

the same time. For example, a mobile phone may remain in communication with the repository ~~server~~ through a suspended socket connection to implement the voice response application. At the same time, one or more other mobile or landline phones (or any other compatible communication device) may preferably be downloading from or interacting with the repository ~~server~~ through other asynchronous, multiplexed socket connections on the same line. At any required time, the mobile phone with the suspended socket connection may re-activate the suspended connection to interact further with the repository ~~server~~ without requiring the suspension or deactivation of the other connections.

Please replace the paragraph beginning at line 6 on page 9 with the following amended paragraph.

FIGURE 2B is a high-level block diagram illustrating a preferred embodiment of the present invention showing multiple XIVR repositories ~~servers~~;

Please replace the paragraph beginning at line 6 on page 11 with the following amended paragraph.

In the preferred embodiment of the present invention shown in FIGURE 2A, XIVR repository ~~server~~ 202 is connected to a data network, Internet 200, using data connections 201. "Callers" preferably access the system through an asynchronous data network, such as Internet 200. The access may be implemented in any manner available to access Internet 200. For wireless users, a "caller" may access XIVR repository ~~server~~ 202 using mobile phone 26, laptop computer 25, with wireless modem capabilities, and/or hand-held computer 27, also with wireless communication ability. The wireless users preferably connect to Internet 200 over wireless network 105, and then to XIVR repository ~~server~~ 202 over data connections 201. Users may also preferably access XIVR repository ~~server~~ 202 through direct connections to Internet 200 using computer 24, internet telephone 23, and/or hand-held computer 22; or may connect to Internet 200 via PSTN 100 using compatible phones 20 and 21.

Please replace the paragraph beginning at line 17 on page 11 with the following amended paragraph.

Through its connection to Internet 200, XIVR repository ~~server~~ 202 may be addressed using an Internet protocol (IP) layer address or uniform resource locator (URL). As users access XIVR repository ~~server~~ 202, repository ~~server~~ 202 preferably downloads the voice response application logic, or portions thereof, to the user's communication device. Because the connection is made through Internet 200 and data connections 201, all data is advantageously transmitted asynchronously between XIVR repository ~~server~~ 202 and the user's communication device. This preferably allows more than one user to be connected to XIVR repository ~~server~~ 202 at the same time over a single line of data connections 201, thus preferably reducing the total number of data connections per user generally required for XIVR repository ~~server~~ 202.

Please replace the paragraph beginning at line 26 on page 11 with the following amended paragraph.

Once the application logic has been downloaded, the communication device preferably runs the application locally. Using mobile phone 26 as an example, XIVR repository ~~server~~ 202 downloads the application logic, or portions thereof, to mobile phone 26. When the application logic has been downloaded, the socket connection with XIVR repository ~~server~~ 202 is either closed or suspended pending any further interaction with XIVR repository ~~server~~ 202. Mobile phone 26 then runs the application. Alternatively, mobile phone 26 may begin running the voice response application before the application logic, or portions thereof, is completely downloaded. Additionally or alternatively, initial portions of the voice response session may preferably come from XIVR repository ~~server~~ 202 directly, while the application is loading to mobile phone 26. Such features would preferably allow a more seamless interface with the user. Voice messages and prompts are preferably played for the user directly over mobile phone 26's speaker. The user may respond as usual to the voice messages and prompts.

Please replace the paragraph beginning at line 10 on page 12 with the following amended paragraph.

In the preferred embodiment of the present invention, the user's responses will preferably be processed at mobile phone 26. Therefore, the user's response messages will not

have to be transmitted back to XIVR repository ~~server~~ 202, subjecting the audio to signal degradation caused by the noise injection typical in such transmission. Alternatively, mobile phone 26 may transmit all or some inputs from the user to XIVR repository ~~server~~ 202 for processing. For example, menu navigation responses may be processed locally, while the ultimate request for data is processed at XIVR repository ~~server~~ 202 or other coupled systems.

Please replace the paragraph beginning at line 3 on page 13 with the following amended paragraph.

For more complex applications, or applications that handle sensitive data, such as financial information, mobile phone 26 would preferably establish additional, subsequent connections, or simply re-activate a "suspended" socket connection to XIVR repository ~~server~~ 202 in order to retrieve the requested information. Referring again to the banking example, after the user requests balance information, mobile phone 26 preferably processes the verbal response, determines the action requested, and then preferably accesses the socket connection to XIVR repository ~~server~~ 202 again. Because the next connection is to obtain further information corresponding to the downloaded voice response application, a code may preferably be added to the header of the data transmission indicating to XIVR repository ~~server~~ 202 that the following socket connection is a "continued" connection. This code advantageously prevents XIVR repository ~~server~~ 202 from attempting to download the initial application logic again.

Please replace the paragraph beginning at line 14 on page 13 with the following amended paragraph.

The data transmitted from mobile phone 26 would also preferably contain the processed request from the user to obtain the user's account balance. XIVR repository ~~server~~ 202 preferably uses the request and other transmitted user input to find the account information in database 207. XIVR repository ~~server~~ 202 will then preferably package the responsive information and send it back to mobile phone 26 for presentation to the user. The packaged response may preferably be encrypted and may comprise an audio file for playback on mobile phone 26's audio player, a text file for use in a text-to-speech synthesis process at

mobile phone 26, and/or text or graphics files for visual presentation on mobile phone 26's display. Thus, for all requested information that is not downloaded along with the downloaded application logic, mobile phone 26 will re-establish the data connection with XIVR repository ~~server~~ 202 to obtain the appropriate responsive information.

Please replace the paragraph beginning at line 25 on page 13 with the following amended paragraph.

Extensible voice response applications preferably may also call other applications resident on XIVR repository ~~server~~ 202, or otherwise coupled thereto, as a part of the voice application processing. For example, a stock brokerage application may have several different and extensible functions available for a user to access. However, downloading the entire application may be prohibitively time and resource consuming, for communication devices with limited memory and/or processing capabilities, such as mobile phone 26 and the like. Furthermore, not every user will want to execute all available functions. Therefore, it would be a more efficient use of memory and of the available bandwidth between the communication device and XIVR repository ~~server~~ 202 to only load portions of a complete voice response application. In such an application, the different functions may preferably be broken into different executable modules corresponding to available features. Thus, the first downloaded module may preferably include only the functions necessary to check balances and stock prices. It may also have options to buy and sell stocks. When a user selects the option to sell stocks, the downloaded application logic preferably causes mobile phone 26 to re-establish or unsuspend the socket connection with XIVR repository ~~server~~ 202 to download the "sell" module. The sell module will preferably replace the initial module in mobile phone 26 and execute its voice messaging and functionality in a similar manner.

Please replace the paragraph beginning at line 14 on page 14 with the following amended paragraph.

With regard to memory resources, it should be noted that a preferred embodiment of the present invention would advantageously manage the application logic stored on XIVR repository ~~server~~ 202 in accordance with the memory limitations of the particular communication device connecting to the system. XIVR repository ~~server~~ 202 would

preferably include software to break down the application logic modules into appropriately-sized sub-modules suitable for running on the limited-memory devices, such as mobile phone 26 or hand-held computers 22 and 27. The system would preferably be able to read the type of connected device through the header data of the connection packets transmitted from the communication device. Upon connection and recognition of a limited-memory device, such as hand-held computer 27, XIVR repository ~~server~~ 202 preferably downloads the first executable sub-module sized according to the memory limitations of hand-held computer 27. As the user completes execution of the first sub-module, hand-held computer 27 accesses the data connection socket with XIVR repository ~~server~~ 202 and preferably downloads the next executable sub-module. This paging sequence would preferably continue until the application is ended, either by the user or the system.

Please replace the paragraph beginning at line 7 on page 15 with the following amended paragraph.

In a further alternative embodiment of the present invention, XIVR repository ~~server~~ 202 may directly connect an agent to a user by incorporating the universal gateway capabilities of the aforementioned, co-pending, commonly assigned, U.S. Patent Number 6,195,357, ~~application~~ entitled, "INTERACTIVE INFORMATION TRANSACTION PROCESSING SYSTEM WITH UNIVERSAL TELEPHONY GATEWAY CAPABILITIES." XIVR repository ~~server~~ 202 may preferably directly connect a user using either a synchronous or asynchronous voice-connection with an agent also using either a synchronous or asynchronous voice-connection. The capabilities described in the above-styled application allows for direct connection of the dissimilar connection types.

Please replace the paragraph beginning at line 20 on page 15 with the following amended paragraph.

For example, a caller using landline phone 21 may preferably access XIVR repository ~~server~~ 202 over data links 201 to begin receiving the program code to operate a first voice response application. During the course of running the first application, the caller may preferably be presented a choice or given a hyperlink option to go to a second XIVR to run another voice response application. With reference to the banking example, the first

application may give the user an option to open a brokerage account with a related brokerage company. On choosing this option, landline phone 21 preferably establishes a connection with XIVR repository ~~server~~ 203 over Internet 200 using data connections 204. XIVR repository ~~server~~ 203 preferably downloads the application logic to landline phone 21 for running the brokerage account voice response application. The caller would then preferably interact with the brokerage account application running on landline phone 21, which will then communicate the response data and any other necessary information for opening the brokerage account with XIVR repository ~~server~~ 203. Repository ~~Server~~ 203 will also preferably communicate with database 205 to store and retrieve information needed by landline phone 21 to further operate and complete the brokerage account application.

Please replace the paragraph beginning at line 6 on page 16 with the following amended paragraph.

FIGURE 3 illustrates an alternative embodiment of the present invention configured to initiate a connection with the inventive XIVR 202 using a voice/phone connection. Typical operation of prior art IVR systems begins with a user establishing a voice connection to the IVR. The present alternative embodiment uses a voice connection to initiate the XIVR system. The system is preferably accessed using any one of communication devices 20 - 27. To initiate the system, the communication device, e.g., mobile phone 26, places a voice call to XIVR repository ~~server~~ 202. The wireless connection is processed from wireless network 105 through PSTN 100 to XIVR repository ~~server~~ 202 using trunk 300. Trunk 300 connects to traditional ports preferably included on XIVR repository ~~server~~ 202.

Please replace the paragraph beginning at line 15 on page 16 with the following amended paragraph.

In operation, mobile phone 26 preferably voice-connects to XIVR repository ~~server~~ 202, which initiates a preliminary voice response script. Preferably, through this initial script, all necessary information regarding the target address of mobile phone 26 is advantageously established. Such address information may be gathered either automatically, through calling data such as automatic number identification (ANI), dialed number identification service (DNIS), mobile identification number (MIN), or the equipment serial

number (ESN), or manually through question and answer sequences with the user. This initial script may additionally or alternatively solicit information with respect to an application a caller wishes or needs to be implemented by XIVR repository ~~server~~ 202. It should also be noted that XIVR repository ~~server~~ 202 may have a database of caller associated data. Such a database may contain caller specific information such as IP address or other data information used in establishing the data connection. XIVR repository ~~server~~ 202 may then use the calling data, such as the ANI, DNIS, MIN and/or ESN, to cross-reference the database for the appropriate connection address information. Once the address information has been determined, XIVR repository ~~server~~ 202 preferably establishes a data socket connection and begins downloading the appropriate modules or sub-modules of the application logic to mobile phone 26 over Internet 200 and wireless network 105 through data connections 201. In order to minimize the delay, the application logic may preferably begin executing on mobile phone 26 prior to the completion of the initial download. This advantageously presents a more linear interface with the user.

Please replace the paragraph beginning at line 6 on page 17 with the following amended paragraph.

It should be noted that while the foregoing examples noted use of mobile phone 26 for the inventive system, the present invention is not limited to operation solely with mobile communication devices. Landline phones 20 and 21 may preferably access and execute the extensible voice response applications from XIVR repository ~~server~~ 202 using PSTN 100 and Internet 200 networks to establish a data connection. Moreover, other communication devices such as hand-held computers and desktop or laptop computers may also be used with a preferred embodiment of the present invention.

Please replace the paragraph beginning at line 13 on page 17 with the following amended paragraph.

It should be noted that in the alternative embodiment shown in FIGURE 3, XIVR repository ~~server~~ 202 may preferably use simultaneous, or duplexed voice and data connections with communication devices 20 - 27. This would preferably allow XIVR repository ~~server~~ 202 to simultaneously, or nearly simultaneously, execute the preliminary

voice response script while downloading the application logic to the communication device. For example, phone 21 connecting to XIVR repository ~~server~~ 202 and Internet 200 using PSTN 100 may preferably maintain simultaneous voice and data connections with XIVR repository ~~server~~ 202 if the user subscribes to digital subscriber line (DSL) technology. Wireless communication devices 25 - 27 may preferably duplex between voice and data connections with XIVR repository ~~server~~ 202, under the current mobile communication systems, such as the time division-based global system for mobile communications (GSM) and the digital code division multiple access (CDMA) systems. In the near future, however, mobile systems will preferably support a simultaneous data and voice connection to XIVR repository ~~server~~ 202. The contemplated Third Generation (3G) systems which will utilize developing standards, such as wideband CDMA (WCDMA), and general packet radio service (GPRS), which will overlay a packet-switched network onto the GSM and other time division based systems, each support simultaneous voice and data connections.

Please replace the paragraph beginning at line 3 on page 18 with the following amended paragraph.

FIGURE 4 shows the unique internal structures of an XIVR repository ~~server~~ of the preferred embodiment of the present invention. XIVR repository ~~server~~ 202 preferably extends traditional IVR functionality to each connecting communication device. In an alternative embodiment, XIVR repository ~~server~~ 202 also preferably provides traditional IVR functionality in order to facilitate the extensible application capability. Thus, XIVR repository ~~server~~ 202 comprises much of the same equipment found in traditional IVRs (equipment not shown). However, novel features of XIVR repository ~~server~~ 202 provide the ability to transport voice response functionality, through application logic, discrete programs, or the like, to external devices.

Please replace the paragraph beginning at line 11 on page 18 with the following amended paragraph.

Application logic storage 400 preferably comprises memory to store the executable voice response applications. As XIVR repository ~~server~~ 202 is contacted through PSTN trunk 300 or data connections 201, executable copies of the application logic are preferably

downloaded over data connections 201 to the contacting communication units. The voice response applications are advantageously developed with development environment 401 through computer workstations 40 and/or 41. Unlike traditional IVRs, which may be programmed in proprietary languages generally requiring resident interpreters or compilers, the XIVR system preferably uses an extensible language, which is advantageously transferable to a host processor with the components used to run the given application. Languages such as hypertext markup language (HTML), extensible markup language (XML), VoiceXML, and the like may be utilized in providing the extensibility to program voice response applications for use with XIVR repository ~~server~~ 202.

Please replace the paragraph beginning at line 23 on page 18 with the following amended paragraph.

In an alternative embodiment described further below, XIVR repository ~~server~~ 202 may also preferably facilitate voice-browsing the Internet. In order to accomplish this function, XIVR repository ~~server~~ 202 also preferably comprises HTTP translator 402 (FIGURE 4). As XIVR repository ~~server~~ 202 browses through the Internet, it reads the HTML web pages and advantageously converts the HTML into a compatible format for a voice response application, such as VoiceXML for example, and/or for interfacing with callers through various ones of communication devices 20 – 27. The HTTP is then preferably converted into the appropriate transport protocol and the web pages, or portions thereof, are downloaded to the connecting communication device. The translation executed by HTTP translator 402 preferably converts text-to-speech and notes hyperlinks as special voice cues to inform users of the executable links available. Additionally or alternatively, portions of the web site may be visually presented as text or graphics on a display associated with or connected to the communication device. These conversion components are advantageously included in the application logic downloaded to the connecting devices.

Please replace the paragraph beginning at line 9 on page 19 with the following amended paragraph.

It should be also noted that web sites or web pages may preferably be ~~implement~~ implemented using a compatible extensible voice programming language, such as

VoiceXML. Therefore the XIVR system may not always be required to perform translation of incompatible formats or protocols.

Please replace the paragraph beginning at line 17 on page 20 with the following amended paragraph.

In a preferable example of voice-browsing operation, on an alternative embodiment of the present invention, landline phone 20 preferably accesses XIVR repository ~~server~~ 202 over data connections 201 through PSTN 100 and Internet 200. XIVR repository ~~server~~ 202 may check database 207 to determine whether phone 20 subscribes to the voice-browsing service. If phone 20 subscribes to voice-browsing, the application logic is preferably downloaded and run on phone 20. The application preferably requests the user to speak/spell the URL of the website to access. Additionally or alternatively, a list of favorites may be stored in a user-accessible database disposed either on the communication device or on a database associated with XIVR repository ~~server~~ 202. If such a favorites list is disposed on a database associated with XIVR repository ~~server~~ 202, repository ~~server~~ 202 would preferably download the list to the communication device at the initialization of each application session. Phone 20 preferably returns the URL to XIVR repository ~~server~~ 202, which accesses the website through data connections 201. XIVR repository ~~server~~ 202 preferably retrieves the HTML code for the website and translates it, if necessary, into a compatible language, such as XML or VoiceXML. XIVR repository ~~server~~ 202 then preferably downloads the web page to phone 20, which begins playing and/or displaying the text and hyperlinks from the accessed site.

Please replace the paragraph beginning at line 5 on page 21 with the following amended paragraph.

In one version of this preferred alternative embodiment, XIVR repository ~~server~~ 202 may begin translating each of the web pages corresponding to the available hyperlinks on the page downloaded to phone 20. This pre-translation will preferably increase the speed with which phone 20 receives the next web page, if the user chooses one of the hyperlinks. Alternatively, XIVR repository ~~server~~ 202 may preferably access available counter or statistical software resident on the target web pages to determine the hyperlinks most likely

chosen by a user. The alternative predictive voice-browser will preferably make a statistical choice regarding the resources to expend pre-translating web pages.